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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,532	08/17/2001	Alan Britt	33053	4288

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EXAMINER	
COMPTON, ERIC B	
ART UNIT	**PAPER NUMBER**
3726	

DATE MAILED: 04/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/932,532	BRITT ET AL.	
	Examiner	Art Unit	
	Eric B. Compton	3726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-7,9-11,17-25 and 27-36* is/are pending in the application.

4a) Of the above claim(s) *17-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4-7, 9-11 25 27-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 17-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 10.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3-7, 9-11, 25 and 27-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of a book entitled "Die Castings Their Design, Composition, Application Specification, Testing and Finishing" by Herbert Chase (hereinafter "Chase").

AAPA, as found on pages 1-2 of the specification and Figures 6-10 disclose forming a cylinder heads and crankcases, by the conventional casting process. The primary distinction between the method of AAPA and Applicant's invention is that Applicant relies on a die-casting process with high tolerances. *See* section [0070]. Consequently, Die-casting with high tolerances alleviates the need to machine the mounting flange surface (step 3) and drill and tap the flange openings (steps 5 & 6). *Id.*

Otherwise, the additional manufacturing steps of AAPA are essentially identical to Applicant's invention (e.g. tapping the spark-plug aperture). Compare Figure 10 to 11. The finished product produced by Applicant's invention is intended to have the same structure as that of AAPA having cylinder chamber, spark-plug aperture, exhaust port, and mounting flange. Compare Figures 1-5 to 6-9.

However, AAPA does not disclose die-casting with high tolerances such that additional machining of the mounting flange is not required.

Chase discloses the invention cited above. Chase, on page 13 discloses, "Perhaps the largest aluminum die casting ever produced is a lower ***crankcase*** or oil pan for an automobile engine. It has both internal and external fins to facilitate heat transfer, and all holes are cast to finished size, the only machine work required being the tapping of some holes." (emphasis added). In Figure 9 (bottom) of the crankcase, the mounting flange is clearly shown having the cast opening on the mounting flange. Detailed casting plans for the crankcase are shown on pages 180-181. Specifically, Chase discloses the die-casting process in great detail. A number of examples are further disclosed, including a crankcase. On page 136, Chase notes "***As surface layers are usually the densest as well as the strongest portions of the castings, it is desirable to disturb them as little as possible by grinding or other machining, especially as the layer of metal just below the surface often contains minute pores which, if uncovered, may show up when the surface is finished***." (emphasis added). Additional reference is directed towards designing die-castings such that grinding is minimizing since the surface quality of die-castings is of such high quality.

Pages 226-227. On page 138, "A large proportion of die castings are given no other surface treatment than fin removal, but those which are to be enabled or lacquered are often sand blasted. This type of treatment is not always recommended, and should in any case be used with discretion, as excessive sand-blasting will remove the surface and is likely to uncover sub-surface pores." Page 227. *See also* the teachings of the Prior Art, below, discussing essentially the same problem.

Regarding claim 1, 3, 7, 9, 25, and 27, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed a cylinder head and crankcase assembly for a small engine of AAPA by die-casting without machining the mounting flange, in light of the teachings of Chase, in order to preserve the density of the of the surface layer and to minimize or eliminate finishing.

Regarding claims 10, 11, 31 and 32, Chase discloses, "Die castings usually have a surface so smooth as to require no grinding or polishing other than that required for fin removal ..." Page 227.

Regarding claims 4, 5, 6, 7, 28, 29, 30, 33, 34, and 35, Chase discloses the tolerances for aluminum are 0.002 inch; the footnote suggests ±0.0015 in. per in. for commercial accuracy as well. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

4. Claims 16 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chase or AAPA/Chase, in view of JP 11-093770 to Osawa (SUZUKI).

Chase discloses the invention above; however does not disclose the die-casting a groove for an O-ring gasket-sealing member.

Osawa discloses an intake passage structure for an internal combustion engine. The cylinder head cover (3) is formed by a die-casting process to include recesses (3a) on the mounting surface for a sealing member (5). JPO English Abstract; see also Figure 6.

Regarding claims 16 and 36, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the crankcase of Chase or cylinder head and crankcase AAPA/Chase, having an O-ring groove, in light of the teachings of Osawa, in order to effectuate better sealing between the crankcase and engine.

Prior Art References

The prior art references listed on the enclosed PTO-892, but not used in a rejection of the claims, are cited for their teachings of die casting engine parts.

The prior art is abounding with teachings of the same problem that Applicant faced:

U.S. Pat. 5,025,760 to Webb et al disclose cylinder heads formed by a die casting process. *See* Col. 2, lines 52-58. In the prior art, it was disclosed that [M]achining is typically necessary to correct other defects." Col. 1, lines 28-29. Thus, to overcome the disadvantages in the prior art, a die-casting process is used. "There are several advantages to the die-casting process. All-metal mold, external-pressure

castings have ***clos tol ranc s***, sharp outlines and contours, ***fin sm oth surfaces***, and a high rate of production accompanied by low labor costs. Fine section and excellent detail can be achieved, together with long mold life." Cols. 1-2, lines 65-2 (emphasis added).

A book entitled "Die-Casting A manual for the user, buyer, and designer" by Arthur Street (hereinafter "Street") discloses the die casting process in great detail. On page 117, regarding machining, Street discloses, "The dimensions of a die-casting should be arranges to be such that a minimum amount of machining is necessary. ***This is because the skin (particularly of a pressure die-casting) is much harder and finer grained than the interior, consequently it is to the user's advantage that as little as possible of this skin shall be removed by a machining operation.***" (emphasis added). On pages 21-22, Sheet discloses the surface dimensions for essential details within ±0.005 in. per inch and holes can be made to similar accuracy; and on page 117, discloses that pressure die casting is accurate to about ±0.0015 in. per inch. Figure 19, on page 62, shows a carburetor body and cover having a mounting flange having cored holes formed therein formed by die casting.

A book entitled "Die Casting" by H. H. Doechler (hereinafter "Doehler"), discloses the die casting process in great detail. On page 196, Doehler shows a cylinder head for a small engine, having cooling fins, cylinder chamber, mounting brackets, and mounting flange, produced by a die-casting process. "Die castings can be produced commercially to closer dimensional tolerances than is possible with ... process, with a corresponding saving of machining time and materials." Page 220. On page 180, Doehler discloses the

tolerances for die-casting are disclosed: minimum ±0.0015 in; at least ±0.003 for commercial uses, for aluminum. Applicant seeks to use aluminum as well. Specification, page 1, [0005]. On page 191, discloses forming bosses and projections "used primary as fastening points ... when a die casting is later fitted to mating parts..." *Id.* On page 226, Doehler discloses "By careful coordination and control of the casting variables, such as metal and die temperature, pressures, shot speeds, and lubrication, as well as grating and venting, die casting can be made sound and free from porosity." "Household gas-meters, automotive hydraulic transmission parts, and various type of valves are examples of such sound die castings which do not require any treatment to make them reliable and successful." *Id.* Other "castings cannot be relied upon to have the same leakage resistance ... due to a less compact metal structure." *Id.* Furthermore, Doehler discloses that cylinder heads, engine blocks and crankcases may be produced having an "as-cast" finish, (5^{th} class mechanical). Pages 351, 353. Cored holes can be produced. Page 181-183 (Figure 4.16, center, shows cored mounting holes on surface flange).

A book entitled "Die Casting for Engineers" (hereinafter "Die Casting") discloses the die casting process in great detail. The book notes the use on die casting to form crankcases on page 60. On page 80, regarding machining, the book discloses

> Die castings are invariably cast within quite close dimensional limits but some machining, in addition to flash removal, is commonly required, even though it may be only simple operations as punching, drilling, reaming or tapping holes. In general, however, only very light cuts are requires and the work can nearly always be done on light machines and at high speeds. Machining makes it possible to bring dimensions within closer limits and it usually results in surfaces whcich are smoother than can be cast. On the other hand, ... there are advantages in doing as little machine work as will meet requirements. This is

> partly because many castings contain small sub-surface pores which are likely to be uncovered even by light cuts. Such pores result in noticeable surface blemishes, especially when the piece is plated.

On page 112, the dimensional accuracy of die-casting for aluminum is disclosed to be 0.0015 in. per inch. A carburetor body having a mounting flange having holes formed therein is shown on page 116 formed by die casting. Both crankcase and carburetors are under pressure and thus must have closely mating mounting surfaces to prevent leakage.

A guide entitled "Prototyping for Die Cast Components" notes "The exterior of a die cast section, to a depth of approximately 0.020 in. (0.5 mm), is dense and free of porosity, with somewhat mechanical properties."

Response to Arguments

5. Applicant's arguments filed March 19, 2004 (hereinafter "Response"), have been fully considered but they are not persuasive.

Applicant argues that "Chase does not disclose or suggest that 'said as-cast spark-plug aperture is closed at one end by a thin web' and 'removing said thin web that close one end of said as-cast spark-plug aperture' as recited in claims 1, 7, and 25." Response, page 15. These limitations were previously found in claims 2, 8, and 26 (canceled). Furthermore, Applicant argues that 'Chase does not disclose or suggest 'said exhaust port aperture and said intake aperture are closed by thin webs forming portions of said as-cast cylinder chamber' or 'removing said thin webs when said cylinder wall is machined' as recited in claims 3, 9, and 27." *Id.*, pages 15-16.

However, contrary to Applicant's assertions, these limitations are clearly disclosed and/or suggested by Chase. With respect to the oil pan or lower crankcase shown on page 13, Chase notes, "All holes are cored to finished size, and the only machine work required is the tapping of some holes." *see also* Page 180, top left figure (showing blueprint of oil pan or lower crank with casting and machining requirements). "It has both internal and external fins to facilitate heat transfer, and all holes are cast to finished size, the only machine work required being the tapping of some holes." *Id.*, page 13. With respect to cored holes, Chase explains, "Practically all large holes and many small ones in die castings should be cored, and this can be done readily, as a rule, if the design of the casting is made with due regard to the limiting conditions imposed by withdrawal of the core and of holding it in correct position during the casting operation. It may not always pay to core small holes, as drilling or punching may prove to be less expensive in some cases." *Id.*, page 140. "***When as often happens, a thin flash or fin is left in a small cored hole, it is usually necessary to clean this out with a drill or a punch.*** Since this operation is required in any event on some castings, and the use of small-cored holes may tend to slow the casting operation somewhat, it sometimes pays to drill or punch such holes as part of the cleaning operation, rather than to core them, especially where they pass through thin walls." *Id.*, page 143 (emphasis added).

This is entirely consistent with Applicant's disclosure.

> The spark plug hole or opening 28 is drilled and tapped and the axially aligned fin openings 24 are drilled. The spark plug opening 28 is substantially formed during the molding as indicated in phantom 28b in Fig, 5. ***To simplify the problem of a through hole core pin in the mold, a thin w b of material clos s off the***

> ***op ning 28 in th cast condition. It is this thin web that is removed during the drilling step in Fig. 11.*** It is contemplated that the drilling step may be eliminated by the use of a through hole core pin, i.e., a core pin entering the mold surface, which forms a top side 30 of the cylinder block. Similarly, the fastener openings 18 and 19 are cast with thin webs of material 18b and 19b, which are removed by a drilling operation as indicated in Fig. 11. Further, the exhaust port 42 and the intake port 32 have as cast thin webs adjacent the cylinder chamber 26. A separate machining operation is not required since these webs are removed during the boring operation. Additionally, it is contemplated that the fin holes 24 need not be machined during the boring but may be provided in the casting. Again, casting the holes 24 requires complicated core pin placement in the mold.
>
> Specification, pages 5-6, Section [0037] (emphasis added).

Therefore, the rejections are maintained.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (703) 305-0240. The examiner can normally be reached on M-F, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter B. Vo can be reached on (703) 308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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